

Zhengguang: A potentially large, high-grade epithermal gold deposit in the Duobaoshan metallogenic belt, Heilongjiang, northeastern China

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Abstract. Traditional ideas and methods are of limited use in deep prospecting in plant and volcanic-covered areas in Heilongjiang Province. The application of the authors' 'three-field anomaly inter-restrain' theory and a new geological-geophysical-geochemical prospecting technique combination has helped the local geological team to learn more about ore-controlling structural and metallogenic information under the cover. Subsequent drilling programs have revealed and assessed a potential large high-grade epithermal gold deposit in the southeastern part of the important porphyry copper belt.

Keywords. Zhengguang, epithermal, Duobaoshan, Heilongjiang

The Duobaoshan copper deposit in Heilongjiang Province was found and exploited in the 1970s. From then on, the area has been considered as an important Paleozoic porphyry copper zone. Although there is a very large reserve of 2.4 million tons of copper in the deposit, the very low grade (average 0.45%) of copper ores has limited its development. In recent years, a potential large high-grade epithermal gold deposit was discovered and quickly assessed in its southeastern part, which may supply us with some new understanding of the particular region.

From 2000, through geochemical survey of stream sediments, the Zhengguang gold prospect was discovered by Qiqihaer minerals exploration team of the Heilongjiang BGMR. After trenching work, altered diorite and andesite were found in the area. Via a series of surface geological and geochemical exploration, geologists have delineated some discrete ore bodies with relatively high-grade of over 100g/t. However, due to the thick cover of plants and soils in the region, they could not learn more deep information by traditional prospecting methods. Therefore, the relationship between ore bodies and ore-controlling structures could not be inferred correctly.

In the autumn of 2002, the authors commenced deep predictive work by means of a combined prospecting technique which consists of metallogenic fluid structural analysis, reflection wave seismic exploration, MT survey (equipped with high frequency sensor), deep penetrating geochemical survey and ground gamma survey. Through

combined field observation, survey and data processing, the complicated folding system, potential breccia pipe and magmatic intrusions have been identified from the profiles. We have inferred that Zhengguang should be a Mesozoic crypto-explosive breccia-type gold deposit. With the help of a new positioning predictive theory termed 'three field (geological-geophysical-geochemical) inter-restrain', favorable metallogenic structural positions (targets or potential mineralization zone) were predicted under the cover (Zhang et al. 2002).

In 2003, local geological teams finished two 500 meter-depth test drill holes which intersected seven ore zones in depths of between 20 and 400 meter. The high-grade ores develop the strong veinlet-type alteration of silicification-pyritization-epidotization. The highest grade is in excess of 30g/t of gold. In addition, the drill holes intersected very thick alteration zones under the cover which extended over 500m in the depth. From the preliminary result, the authors have inferred that there should be a potential large gold deposit under the cover (Zhang, 2004a, b).

In 2004, the Black Dragon Joint Venture which was established by the Heilongjiang BGMR and Leyshon Resources Limited of Australia carried out a 4500 meter diameter drill program in the target zone. The 30 drill holes with the average depth of 150 meters and horizontal spacing 50 meters were arranged within the strong alteration area. Finally, thick (up to 44 meters) ore bodies of high grade (up to 580g/t) were intersected in the depth. Among them, Hole ZGD029 recorded 24 meters @ 28.6g/t Au, including 6 meters @ 93.0 g/t Au at about 90 meters below the surface. The estimated gold reserve of the explored area is more than 20 tons (Leyshon Resources Limited, 2004a, b, c, 2005).

The discovery of the Zhengguang gold deposit has further confirmed the existence of a major epithermal gold mineralization belt in the Mesozoic volcanic areas along the Heilongjiang River bordering Far East Russia. Therefore, a significant number of prospecting targets is likely to be delineated in the near future (Zhang et al. 2004).

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